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1 Attorney Docket No. 79454

2
3 A LENS ASSEMBLY AND HOUSING THEREFOR
4 FOR USE WITH A SUBMARINE PERISCOPE

5
6 STATEMENT OF GOVERNMENT INTEREST

7 The invention described herein may be manufactured and used
8 by and for the Government of the United States of America for
9 Governmental purposes without the payment of any royalties
10 thereon or therefor.

11
12 BACKGROUND OF THE INVENTION

13 (1) Field of the Invention

14 The invention relates to lenses for viewing devices, such as
15 periscopes, telescopes and microscopes, and is directed more
16 particularly to a lens frame and a pocket for receiving same for
17 use on a submarine periscope.

18 (2) Description of the Prior Art

19 In current submarine periscopes, circular lenses are screwed
20 into place when needed. The lenses are affixed to a periscope
21 assembly eye guard housing and, in particular to a component
22 thereof referred to as a "blinder assembly". The blinder
23 assembly serves to block out light to one eye of an operator and

1 permit light to pass through a viewing aperture having therein a
2 lens, such as a clear glass or, alternatively, a filter, to the
3 other eye of the operator. When a lens is not in use, it often
4 becomes misplaced or lost. There is no storage facility for
5 lenses on the blinder assembly and, being relatively small (about
6 1 inch in diameter), the lenses are easily set aside and
7 forgotten until needed, by which time the lens has frequently
8 disappeared. However, even when properly stored and retrieved,
9 screwing the lens into a blinder assembly requires a steady hand,
10 sometimes under pressure.

11 In U.S. Patent No. 2,953,970, issued September 27, 1960, to
12 Charles A. Maynard, there is shown a lens assembly in which one
13 or more lenses are attached in telescopic fashion to an optical
14 apparatus. A first lens is provided with a magnetic ring which
15 is magnetically attracted to a magnetically permeable barrel ring
16 of the optical apparatus. By virtue thereof, the first lens is
17 held on the optical apparatus. A second lens may similarly be
18 mounted on the first lens, and so on with additional lenses, to
19 provide a series of axially aligned lenses selected for a given
20 purpose.

21 In Maynard, adjacent lens retaining rings contain
22 permanently magnetic portions, the poles of which are alignable
23 with unlike poles in an adjacent ring. Each ring is provided

1 with both north and south poles directed in each of two axial
2 directions. The various unlike poles are attracted to each other
3 to support one ring with respect to an adjacent ring. To
4 disengage one ring from another, one ring is rotated with respect
5 to the adjacent ring until similar poles are aligned, to cause a
6 repelling force between the adjacent rings, which aids in
7 disassembly. Alternatively, one ring may be rotated to a point
8 of equilibrium, or non-attraction between the rings, permitting
9 one ring to be detached from the adjacent ring.

10 The handling of the lens rings in the Maynard apparatus is
11 thus not far removed from the current screw thread attachment in
12 submarine periscope assemblies, described briefly above. Having
13 to rotatably align rings so as to achieve magnetic equilibrium or
14 repelling forces, is still required under less than ideal
15 conditions.

16 Accordingly, there is a need for a lens which easily can be
17 stored, retrieved from storage, and inserted into and removed
18 from a pocket or housing in the periscope blinder assembly, and
19 all done in a time efficient manner.

21 SUMMARY OF THE INVENTION

22 An object of the invention is, therefore, to provide a lens
23 assembly and housing therefor for use in conjunction with a

1 submarine periscope, and which is easily and quickly stored, and
2 easily and quickly retrieved from storage for use. The lens is
3 slipped into place in a pocket or housing in the blinder assembly
4 and held in place without the use of tools or discrete fasteners,
5 but easily removed from the blinder assembly and returned to
6 storage.

7 With the above and other objects in view, as will
8 hereinafter appear, a feature of the invention is the provision
9 of a lens assembly and lens assembly housing for use in
10 conjunction with an optical apparatus. The lens assembly
11 comprises a generally planar lens frame of nonferrous material
12 and defining a window having a lip therein disposed along a
13 periphery of the window, a lens disposed in the window and
14 adjacent the lip, a pair of spaced magnets on the frame, and a
15 grip formed on the frame. The lens assembly housing comprises
16 first and second walls opposed to each other and in part defining
17 a pocket, the first wall being nonferrous and the second wall
18 being magnetically permeable, the pocket being adapted to receive
19 the lens assembly with the grip of the frame extending beyond the
20 pocket. The magnets interact with the magnetically permeable
21 second wall of the pocket to releasably retain the lens assembly
22 in the lens assembly housing.

1 The above and other features of the invention, including
2 various novel details of construction and combinations of parts,
3 will now be more particularly described with reference to the
4 accompanying drawings and pointed out in the claims. It will be
5 understood that the particular device embodying the invention is
6 shown by way of illustration only and not as a limitation of the
7 invention. The principles and features of this invention may be
8 employed in various and numerous embodiments without departing
9 from the scope of the invention.

10
11 BRIEF DESCRIPTION OF THE DRAWINGS

12 Reference is made to the accompanying drawings in which is
13 shown an illustrative embodiment of the invention, from which its
14 novel features and advantages will be apparent, and wherein
15 corresponding reference characters indicate corresponding parts
16 throughout the several views of the drawings and wherein:

17 FIG. 1 is a front elevational view of a lens assembly in
18 accordance with the invention;

19 FIG. 2 is a sectional view taken along line II-II of FIG. 1,
20 showing the lens assembly disposed in a cooperating pocket in a
21 lens housing assembly; and

22 FIG. 3 is a sectional view taken along line III-III of FIG.

23 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIGS. 1 and 2, it will be seen that the lens assembly 10 includes a generally planar frame 12 defining a window 14 having a lip 16 therein disposed along a periphery of window 14. The frame 12 is provided with first and second planar side surfaces 18, 20. The lip 16 is an extension of first side surface 18. The frame 12 is of a non-ferrous material, such as aluminum.

A lens 22 is disposed in window 14 and is adjacent lip 16. The lens 22 is of a thickness such that a peripheral portion of a first major surface 24 of lens 22 is fixed to lip 16. A second major surface 26 of lens 22 is flush with frame second surface 20. The lens 22 preferably is fixed to lip 16 by adhesive, or the like. As seen in FIG. 1, lens 22 preferably is circular and lip 16 is an annulus, as shown, or one or more portions of an annulus. The lens preferably is of glass or a plastics material, or a composite thereof. The lens may be of clear glass, or of a prescription-type glass for enhancing eyesight, or increasing the focus range of the periscope at both ends of the usual periscope range of focus, or a filter of darkened glass, similar to sunglasses, or a mirrored glass for substantial sun filtering, or may be omitted altogether, such that viewing occurs through the lens assembly without benefit of a lens of any type, or may be a

1 "blank", that is, an opaque plate which stops light passing
2 through the assembly.

3 The frame 12 is further provided with at least two openings
4 30 in each of which is fixed a magnet 32a, 32b. The magnets
5 preferably are disposed, respectively, on opposite sides of a
6 lengthwise axis of bilateral symmetry a-a (FIG. 1) and are in
7 substantial alignment widthwise.

8 A grip 36 extends from frame 12 and preferably comprises a
9 protrusion integral with frame 12. The grip 36 is provided with
10 opposed recessed portions 38 (FIG. 1) to facilitate gripping
11 thereof by an operator.

12 Referring to FIGS. 2 and 3, it will be seen that a lens
13 assembly housing 40 includes a pocket 42 defined in part by first
14 and second walls 44, 46 opposed to each other. The first wall 44
15 is of a nonferrous material, such as aluminum. The second wall
16 46 is magnetically permeable. As shown in Fig. 2, the pocket 42
17 is adapted to slidably receive the lens assembly 10 with the
18 grip 36 extending outwardly from the housing 40 to facilitate
19 manipulation of the lens assembly by an operator.

20 In operation, one or more lens assemblies 10 are disposed in
21 the optical line of sight of the blinder, or are disposed in
22 storage facilities, such as housing 40, that include the first
23 and second walls 44, 46. The wall 46 is made of a ferrous metal

1 that is magnetically permeable, i.e., provides a flux path. The
2 other wall 44 is nonferrous. The two magnets 32a, 32b are press
3 fit into the lens assemblies 10 such that they are flush mounted
4 within the thickness of the lens assembly frame 12. The magnets
5 32a, 32b are adapted to generate a magnetic circuit flux. The
6 flux, in turn, generates a magnetic force between the magnets
7 32a, 32b and the ferrous wall 46.

8 When the lens assemblies are housed in the blinder or
9 housing 40, the grips 36 are exposed. The grips 36 may be
10 provided with visible indicia by which lenses may be
11 distinguished. An operator removes an appropriate lens assembly
12 10 from the blinder housing or storage facility by grasping the
13 appropriate exposed grip 36, exerting a small amount of force and
14 withdrawing the lens assembly. The operator then places the lens
15 assembly in the viewing position slot, bringing the lens assembly
16 magnets 32a, 32b into contact with the ferrous material (i.e.,
17 magnetically permeable material) portion of the blinder assembly
18 pocket which then holds the lens assembly in place in the viewing
19 position. When use of the lens is no longer desired, the lens
20 assembly 10 is manually withdrawn from the pocket of the blinder
21 assembly, i.e., the viewing position, and returned to its place
22 in a storage slot. As is well understood in the art, the disk
23 magnets 32a, 32b each generate a flux field through the adjacent

1 zone of the wall 46 which is made of ferrous material. This acts
2 as a magnetic detent, securely maintaining the lens assembly 10
3 in the pocket 42 until manually withdrawn.

4 There is thus provided a lens assembly which easily can be
5 stored, retrieved from storage and inserted into a periscope
6 blinder assembly viewing position. When desired, the lens
7 assembly easily can be removed from the blinder assembly viewing
8 position and returned to storage. No tools are required, and
9 time required to provide a lens, or change lenses, is minimal.

10 It will be understood that many additional changes in the
11 details, materials, and arrangement of parts, which have been
12 herein described and illustrated in order to explain the nature
13 of the invention, may be made by those skilled in the art within
14 the principles and scope of the invention.

15 For example, while the above description of the
16 invention is focused on the use of the invention in combination
17 with a submarine periscope, and while it is expected that the
18 invention will provide substantial benefits when used in that
19 manner, it will be apparent that the invention finds further
20 application in connection with telescopes and microscopes, and
21 any optical device or viewing device in which use of lenses is
22 beneficial.

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6 ABSTRACT OF THE DISCLOSURE

7 In a lens assembly and housing therefor for use in
8 conjunction with an optical apparatus, the lens assembly includes
9 a lens frame of nonferrous material and defining a window having
10 a lip therein along a periphery of the window, a lens disposed in
11 the window and adjacent the lip, a pair of spaced magnets on the
12 frame, and a grip formed on the frame. The housing includes
13 first and second walls opposed to each other and in part defining
14 a pocket, the first wall being nonferrous and the second wall
15 being magnetically permeable, the pocket being adapted to receive
16 the lens assembly with the grip of the frame extending beyond the
17 pocket. The magnets interact with the magnetically permeable
18 second wall of the pocket to releasably retain the lens assembly
19 in the lens assembly housing.

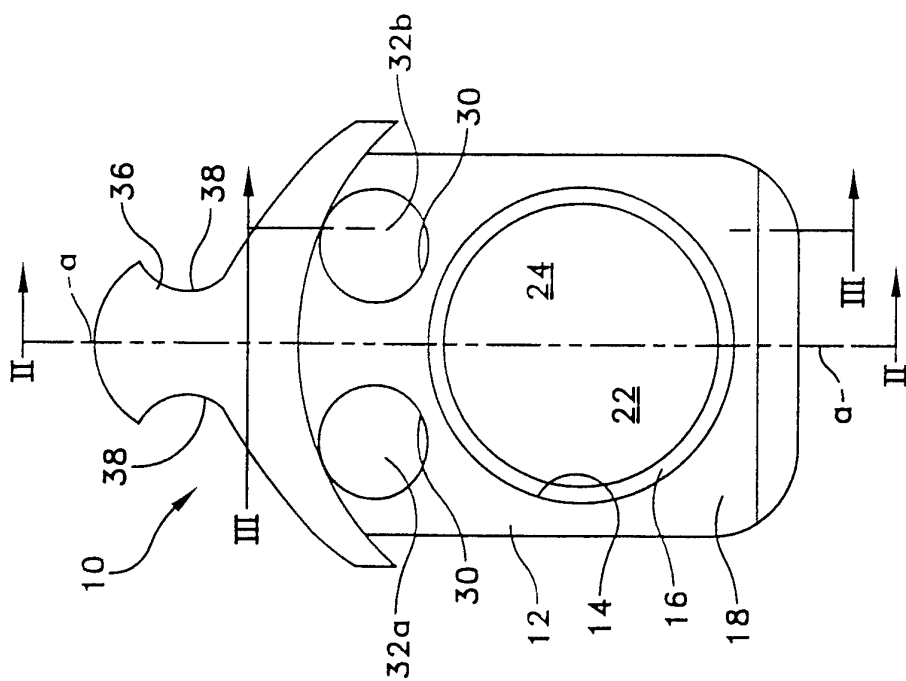


FIG. 1

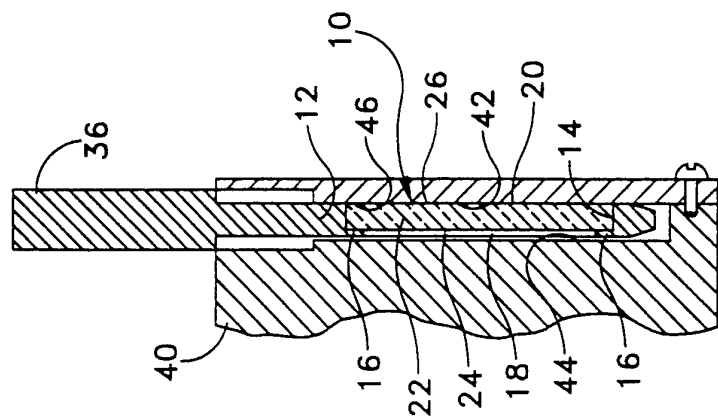


FIG. 2

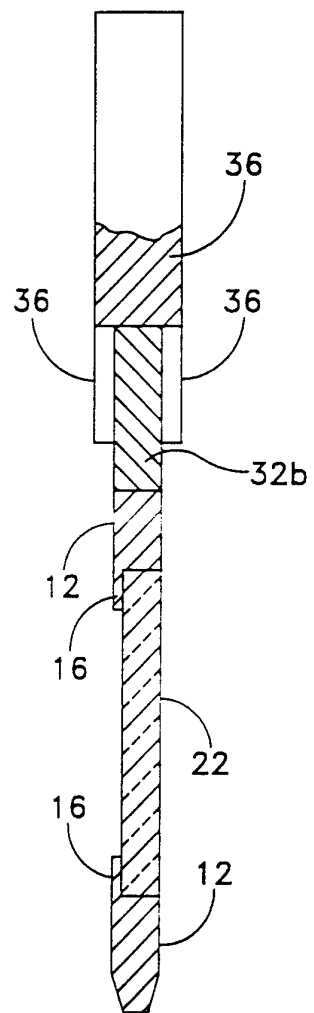


FIG. 3